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Abstract

Following their EU15 counterparts, the banking systems of Central and Eastern European (CEE) countries underwent extensive reform since the 1990s. In this paper we estimate the degree of bank market power during the periods of financial reform in each European country, and subsequently we analyze the political and institutional sources of bank competition distinguishing between the EU15 and CEE subgroups. A linear pattern in the relationship between bank competition and institutional strength is demonstrated for the EU15 group of countries, while for the CEEs this pattern is non-linear. Therefore, we suggest that relatively underdeveloped banking systems, in less advanced politico-institutional milieus, overall fail to benefit from reforms in their early stages. As a policy implication the results imply that a certain level of institutional maturity, combined with openness to foreign investors, is a precondition for reforms aiming at enhancing competition and efficiency of banking markets.

JEL Classifications: P34; P51; C1

Keywords: Bank competition; Financial reforms; Institutional development; European Union; Central and Eastern European countries

1. Introduction

This article focuses on the effect of the institutional environment on bank competition (market power) in 15 older European Union (EU15) countries as compared to 14 Central and Eastern European (CEE) countries, during financial reform periods. The comparative political economy debate has devoted particular attention to the financial and banking system, and its relationship with state institutions (e.g. Zysman, 1983; Pagoulatos, 2003; Verdier, 2003). However, the political and institutional forces that shape competition in the banking sector have not been given special consideration. We find strong evidence that the institutional conditions prevailing in the countries examined during the reform period play a critical role in shaping bank competition.

Since their transition to democracy and the market economy, CEE economies have been steadily gravitating towards Western Europe, in terms of markets and institutions. Their process of Europeanization, driven by the successive objectives of EU and EMU accession, generated expectations of convergence (Dyson, 2006). What are the limits of convergence? Different institutional endowments, departure points and transition paths engendered dissimilarity of outcomes, enriching the "varieties of capitalism" debate (Hall and Soskice, 2001; Amable, 2004) with a new set of empirical observations. Some have suggested that CEEs form a distinctive cluster or variety of capitalist democracy, with much in common with the EU15 cohesion group (McMenamin, 2004).

Both in the EU15 and the CEEs the banking sector led structural reform with a uniform trend towards privatization and sectoral liberalization. Privatization and liberalization/deregulation were usually followed by policies of re-regulation, aimed at systemic safety and consumer protection (Majone, 1996). European banking reform relied extensively on EC competition policy and the pursuit of a single European market. Since the early to middle 1980s, one EC/EU country after another proceeded to stimulate internal banking competition (Bröker, 1989) and liberalize the banking sector. Beginning in the early 1990s, with a few years-time lag, the CEE countries mirrored the twin processes of banking liberalization/privatization and re-regulation, the latter in the form of safety nets and supervision. The liberalization/privatization momentum in CEEs amounted to systemic privatization (Feigenbaum et al., 1998), being part of a transition

process from state ownership and central planning to private ownership and market competition. A recent ECB study assesses that banking and financial markets in new member states remain significantly less integrated than those of the EU15 or the Eurozone, but integration is well under way and has accelerated notably, driven by an expanding EU banking presence (ECB, 2008).

Yet, while subject to similar external pressures and constraints, post-communist CEEs followed individual political and economic transition paths, mainly owing to very different levels of institutional strength during the period of financial reform. Varying transition paths from central planning to market economy have resulted in different legal and politico-institutional frameworks, which have consequently affected the efficient functioning of banking systems. For example, in some cases privatization was implemented so as to benefit the political power holders of the previous and transitional regime, leading to what some have described as "political capitalism", encouraging oligopolistic market structures (Staniszkis, 1991). In other post-communist banking systems, a stark dichotomy of ownership between post-communist state and foreign private capital has been observed, in what has been branded "capitalism without capitalists" (Eyal et al., 1998). Furthermore, the relatively weak legal systems of CEEs compared with their EU15 counterparts, as well as the high levels of networking and corruption in the financial system, may have limited the strength of competitive forces.

Given the above similarities and differences in the processes of liberalizing the banking systems of EU15 and CEE countries we ask the following questions. Did reforms in the EU15 and CEE financial sectors (in the different periods that these occurred) succeeded in generating competitive conditions in the corresponding banking systems? What was the role of the institutional environment in shaping banking sector competition during the period of reforms? And, if results for the two subgroups are not uniform, what are the policy implications for future reform initiatives? To address these questions we first define periods of financial reform for each of the EU15 and CEE countries considered. Second, in an ambitious endeavor, we estimate the market power of individual banks in all these countries during the periods of reform. Subsequently, we examine whether the relationship between indicators of institutional strength and bank

market power is uniform across the two groups of countries. Finally, on the basis of our findings, we provide policy implications.

2. Defining periods of financial reform

We build a large panel dataset to investigate the bank competition-institutional strength nexus during the period of financial reform. The first issue in building this dataset is to define periods of financial reform for the EU15 and the CEE countries. To this end, we use the financial reforms index (henceforth FRI) of Abiad et al. (2008), which covers the EU15 countries and 17 CEEs.[1] The FRI includes 91 countries in total over the period 1973-2005, whereas previous indices (e.g. the one of Kaminsky and Scmuckler, 2003, or the European Bank for Reconstruction and Development [EBRD] index of banking sector reform) have smaller coverage in terms of years and/or countries. In addition, the FRI covers a wide array of reform processes.

More specifically, this is a composite index including 7 pillars that receive a score on the basis of whether the financial sector is liberalized or not. These seven pillars, with range of scores in parentheses, are as follows: credit controls and reserve requirements (0-4), aggregate credit ceilings (0-1), interest rate liberalization (0-4), banking sector entry (0-5), capital account transactions (0-3), privatization (0-3), securities markets (0-5) and banking sector supervision (0-6). In general, low scores indicate repressed financial sectors and high scores liberalized financial sectors.[2] In the present paper we exclude the capital account transactions pillar from the analysis because it does not directly refer to the banking sector, but rather it refers to the exchange rates system (unified or not) and to whether a country has restrictions on capital inflows or outflows. Therefore, we construct a composite indicator on the basis of the six other pillars, and this index can take values

[1] The CEE group of countries includes Albania, Azerbaijan, Belarus, Bulgaria, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Poland, Romania, Russia, Ukraine and Uzbekistan. The EU15 group includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden and UK.

[2] For the last pillar (banking supervision) a high score indicates high regulation and a low score an unregulated financial sector. Note that a high score for this pillar implies that the country has reformed the banking sector so that (i) a capital adequacy ratio is adopted, (ii) banking supervisory agency is independent from executives' influence, (iii) banking supervisory agency conducts effective supervisions through on-site and off-site examinations and (iv) the banking supervisory agency covers all financial institutions without exception. This kind of regulation is considered as a "positive" reform (re-regulation) aiming to enhance financial stability mainly through safety nets. Therefore, the value of this sub-index is added to the general FRI score.

from 0 to 28. As the index principally quantifies reforms in the banking sector, we use the terms "financial" and "banking" reform interchangeably.

A number of criteria are set to build the final sample of countries on the basis of the FRI. First, from the 17 CEE countries included in the FRI we exclude Uzbekistan because the level of financial reform in this country remains particularly low (below 10) as of 2005 (no particular efforts of reform are observed); this leaves us with 16 CEEs. We also exclude Georgia and Kyrguz Republic because no indices characterizing the institutional environment are available for these two countries for the required time period; this leaves us with 14 CEEs. Second, the time span of the panel is different across countries for both the EU15 and the CEE groups. The reason is that, as discussed in the introduction, we investigate the bank competition-institutional strength nexus during periods of financial reform. The starting year for all EU15 countries is 1984, which is the first year of availability of data for the bank-level[3] and institutional variables needed to carry out the empirical analysis. This is approximately the period when financial liberalization initiatives were undertaken in most of the countries in this group. In Table 1 we report the score of the FRI for each country in 1984.

In contrast, the starting year for the CEE panel varies between countries and corresponds to the first year of availability of the FRI (see Table 1). Note that the first year of data availability for the CEEs usually corresponds to the first year each of these countries is described as "transition" by the EBRD (2007). The end year for the countries in both the EU15 and the CEE panels is the year each country in the sample reaches a value of 19 on the FRI plus another 3 years (i.e. if a country reaches 19 on the FRI in 2000 the panel is extended up to 2003). A value of 19 on the FRI implies that in the 6 sub-categories of the index described above, the financial sector is "largely liberalized". The panels are extended for 3 more years so that the market absorbs the changes.[4] Note that for certain CEE countries the reform process was ongoing as of 2005, which is the

[3] The Bankscope database, which is used to obtain the bank-level data, also provided us with some data for the years 1982-83. However, the ICRG database, which is used to obtain indices that characterize the institutional environment does not provide information on these indices prior to 1984. Also, we are not aware of a database that quantifies the quality of institutions with data prior to this year. Yet, we feel that the time span of the dataset is long enough to construct a rich database and carry out a meaningful empirical analysis.

[4] In the empirical analysis below we experimented by extending the time frame of the panels after the countries reached a score of 19 on the FRI by 2, 4 and 5 years. The results remained practically unchanged.

last year of available data on the FRI. Overall, these choices in building the dataset highlight an effort to examine whether institutional strength has important implications for the outcome of bank competition if policy makers decide to reform the banking sector and not to compare the arguably different reform processes among countries. Explicit information on the sample coverage of each country and on the FRI (score in the first and last year for each country) is provided in Table 1.

3. Estimation of bank market power

3.1. Empirical methodology and data

We estimate the degree of bank market power during the period of financial reform in each country using bank-level data. We opt for estimating market power at the bank level because there may be wide differences across banks of the same industry. The approach followed is similar to that of Maudos and de Guevara (2007) and Delis and Tsionas (2009) who estimate the Lerner index of market power. The Lerner index is defined as

$$L_{it} = (p_{it}^{q} - mc_{it}) / p_{it}^{q} \quad (1)$$

and shows the disparity between interest rate (p_{it}^{q}) on bank *i*'s output (*q*) at time *t* and marginal cost (*mc*) expressed as a percentage of p_{it}^{q}. The main advantage of the Lerner index over other measures of market power (e.g. the H-statistic of Panzar and Rosse (1987)) is that it provides a continuous measure of the degree competition and therefore can have higher descriptive power when used as the dependent variable in the subsequent analysis of the determinants of competition. The Lerner index takes values between -1 and 1, with values closer to 1 reflecting higher market power and values closer to 0 increased competitive behavior of banks. In the case of pure monopoly, *L* is statistically equal to 1; under perfectly competitive behavior, *L* is statistically equal to 0; and, finally, $L < 0$ implies pricing below marginal cost. In the latter case it may be that banks do not function within the principles of a market economy and are supported e.g. by the government, which is a situation indicative of totalitarian systems.

Given the significant concerns of the industrial organization and banking literatures regarding the imposition of a constant marginal cost across banks when

estimating the Lerner index, we relax this assumption. In particular, we opt for a modeling framework that allows *mc* to differ across banks and time, thus deviating from the majority of previous literature on the estimation of the Lerner index (which assumes a constant marginal cost). In this respect, we follow Delis and Tsionas (2009) in using a non-parametric technique to estimate observation-specific marginal costs from a cost function. In particular, here we resort to the estimation of the following Cobb-Douglas cost function

$$\ln c_{it} = a_0 + a_1 \ln q_{it} + a_2 \ln d_{it} + a_3 \ln w_{it} + e_{it} \quad (2)$$

where c is the total cost of bank i at time t, q is bank output, d is the value of bank deposits, w are the prices of inputs and e is a stochastic disturbance. This cost function assumes that banks use inputs and deposits to produce output q (for a similar implementation, see e.g. Uchida and Tsutsui, 2005; Brissimis et al., 2008). From Eq. (2), the marginal cost of bank output is simply a_1. Hence, in order to obtain observation-specific estimates of the marginal cost, we need to obtain observation-specific estimates of a_1. This is accomplished by drawing on a non-parametric estimation technique to estimate Eq. (2), in particular the local regression (LR) technique as put forth by Cleveland and Devlin (1988). Bank-level estimates of all of the as (and thus of a_1) are obtained through localization of the parameters. For details on the LR methodology and the estimation procedure, see Appendix.

Estimation of Eq. (2) using the aforementioned technique presents some considerable advantages, besides the obvious one of deriving observation-specific estimates of the marginal cost. First, the non-parametric nature of the method implies that no assumption regarding the functional form of the underlying production relationship is made globally, and it is well-known that it is quite difficult for the researcher to be certain that the "correct" functional form has been chosen. Therefore, choosing for example between the Cobb-Douglas, the translog or any other cost function is not an issue.[5] Second, and given this qualification, economic hypotheses are not rejected simply because an "improper" functional form has been chosen. Third, localization implies that, besides obtaining bank-level marginal costs, bank-level elasticities of cost with respect to

[5] In fact, we have experimented with the translog cost function and we obtained very similar results (within a 5 per cent range).

deposits and input prices are also obtained, which may be quite useful information for managers and policy-makers. In particular, banks may have market power in deposits, which can also be calculated on the basis of a different Lerner index on deposit rates and a_2. Last, but not least, the fact that LR (or any other local method) allows for observation-specific parameter estimates suggests a plausible approach to identify parameter heterogeneity, which may be of great importance in indicating individual bank strategies. For more on these issues, see Kumbhakar et al. (2007).

Data for the bank variables are taken from BankScope. All data are reported in euros and are expressed in constant 1994 prices (using individual country GDP deflators).[6] We limit the empirical analysis to the unconsolidated statements of commercial banks in order to reduce the possibility of introducing aggregation bias in the results. During the sample period a number of M&As and bank failures took place, which are taken into account in our dataset so as to avoid selectivity bias. Only banks with at least three sequential observations are included in the sample. Also, the data were reviewed for reporting errors or other inconsistencies (zero or negative values for the variables used) and some observations are excluded accordingly. We end up with a large unbalanced panel dataset that consists of 22846 observations (14381 for the EU15 and 8465 for the CEE countries). The number of bank observations by country is reported in Table 1.

The price of bank output p^q is proxied by the ratio of total revenue to total earning assets, so as to reflect the full array of bank outputs. Alternatively, we employed the ratio of interest income to the value of total loans. This measure is probably more restrictive for our purpose as it essentially measures lending rates and will reflect market power only in lending, but it is also the measure favored by most of the literature (see e.g. Maudos and de Guevara, 2007). As regards the bank-level variables in Eq. (2), c is measured by real total expenses of bank i at time t, q by real total earning assets and d by real total deposits and short-term funding. Two input prices are considered, the first (w_1) representing the price of labor (measured by the ratio of personnel expenses to total

[6] Here we use the intermediation method in the definition of inputs and outputs. For details, see Berger and Humphrey (1997).

assets)[7] and the second (w_2) the price of physical capital (proxied by the ratio of total depreciation and other capital expenses to total fixed assets). All these variables were carefully reviewed for inconsistencies owing to changes in accounting schemes over the sample period (descriptive statistics are reported in Table 2). In addition, we examined the sensitivity of our results by controlling for credit risk (using the ratio of non-performing loans to total loans). Changes in the results were not significant; however, this measure was not available for many of the banks in the early years of our sample for both the EU15 and CEE countries. Therefore, we report the results of the model without credit risk.

3.2. Estimation results

Estimation of Eq. (2) is carried out for the full sample, since (i) the Lerner index does need defining the market boundaries because it simply represents bank-specific markups and (ii) bank-level (and thus also country-level) heterogeneity is accounted for by the local technique.[8] Average estimates for L on a country- and time-specific basis are reported in Table 3. In general, L averages at 0.34 for the full sample with a minimum equal to -2.34 and a maximum 3.21. 96% of the banks fall in the range that has an economic interpretation as set out above. Note that the values reported in Table 3 are directly comparable between countries and through time. Two stars indicate that the hypothesis of perfectly competitive behavior (no market power) cannot be rejected, while a single star shows that pricing of banking products is below marginal cost (i.e. banks do not behave as profit-maximizing firms). No banking sector is characterized by monopolistic behavior on average. In general, a simple t-test shows that approximately 8 percentage points reflect statistical differences between the values of L (e.g. there is considerable difference in bank market power between L=0.22 and L=0.30).

The overall picture emerging from the average scores of the countries examined is mixed. In most EU15 countries, the average market power is found to be between 0.10

[7] We divide personnel expenses by total assets because the Bankscope database lacks data for the number of bank employees for many banks. A similar approach has been followed by many other relevant papers (see e.g. Altunbas et al., 2001; Claessens and Laeven, 2003).

[8] Various other sensitivity analyses were carried out, including use of time or country dummy variables, use of only one input price and separation of the EU15 and CEE samples. Changes in the results were not statistically significant, thus confirming the power of the local regression method (see also Delis and Tsionas, 2009).

and 0.40, which represents moderately competitive behavior to a larger or lesser degree. Interestingly enough, lower values are observed for many countries shortly after financial reforms intensified, which is a first indication that financial reforms in the EU15 countries led to increased competition between banks. For Germany, the findings suggest that its banking sector could be characterized as perfectly competitive during the period 1987-1990 and that the banking industry is fairly competitive in general. This result is consistent with the fact that the German banking sector is comprised of a large number of relatively small banks. Two special cases are on the one hand the Scandinavian countries and on the other hand Greece and Portugal. In Finland and Norway the market power of banks has been increasing on average since the early 1990s, and this may be the result of the policies undertaken to enhance the profitability of banks in light of the severe banking crisis that hit these countries in the late 1980s and early 1990s. For Greece (principally) and Portugal, the rising market power of banks may reflect the inadequate supervision and monitoring capacity of the regulatory authorities, while, especially in Greece, the majority of banking assets were publicly controlled in the early years of our study[9] and financial reforms were belated compared to the other EU15 countries.

The results obtained for the CEE countries are on average quite different from those for their EU15 equivalents and more or less similar to the ones obtained for Greece. In the beginning of the sample period most banks were operating with low or negative market power, which is consistent with the nature of the old regime. However, financial reform periods in CEEs are associated with significant increases in the average market power of banks. Moreover, the sharpest increases in the average market power of banks are observed in countries that reformed their banking sector quickly and intensively (e.g. Latvia, Hungary and Ukraine). Interesting exceptions to these patterns are Czech Republic, Russia and Belarus, where the average Lerner index remains relatively low as of 2005. This is probably not without a good explanation. In Czech Republic institutions were quite stronger than in the rest of the CEEs, which may have helped the efficient supervision and monitoring of the banking sector during the transition path, and penetration of foreign owned banks in the market immense (84.9% of total banking assets

[9] Public ownership of banks may be associated with lower incentives to maximize profits.

belong to foreign owned banks[10]). Russia is a special case altogether owing to the probably unique political regime (i.e. relatively large political power of the party in office and associated strength to promote policy initiatives) and still high share of state owned banks, while in Belarus the financial reform process has been the most gradual and delayed among the CEE countries examined. Yet, before making more judgments on the determinants of competition, we better move to an explicit analysis of the institutional and other sources of bank market power.

4. Bank competition and the institutional environment

4.1. Empirical model and data

The empirical model used to study the institutional sources of bank competition is of the following form:

$$L_{it} = b_0 + b_1 FRI_t + b_2 IE_t + b_3 M_t + b_4 Z_{it} + \varepsilon_{it}$$
$$\varepsilon_{it} = \nu_i + u_{it} \qquad (3)$$

In Eq. (3) the market power L of banks obtained in the previous section is written as a function of the time-dependent banking sector reform variable *FRI*; a vector of variables *IE* that characterize the institutional environment; a vector of control variables *M* that reflect the macroeconomic conditions in the banking systems examined; and a vector of bank-level control variables *Z*. Finally, ε is the disturbance with v the unobserved bank-specific effect and u the idiosyncratic error. This is a one-way panel data error component regression model, where $v \sim \text{IIN}(0, \sigma_v^2)$ and independent of $u \sim \text{IIN}(0, \sigma_u^2)$.

Table 2 lists the potential determinants of bank competition used in this study, along with some descriptive statistics. As discussed above data on the FRI are obtained from Abiad et al. (2008). Note that banking industry studies use various other measures of the reform process. For instance, Salas and Saurina (2003) and Kumbhakar and Lozano-Vivas (2005) employ all the deregulation events that occurred in the period under examination to capture the deregulation process in the Spanish banking industry. Angelini and Cetorelli (2003) measure deregulation via changes in minimum capital requirements, or through the abrogation of the interest rate ceilings policy. Yildirim and

[10] Foreign owned banks are defined as those with foreign ownership exceeding 50 per cent

Philippatos (2007) choose foreign bank penetration to capture deregulation. Other studies use, *inter alia*, abolition of entry restrictions as deregulatory proxies (e.g. Demirguc-Kunt et al., 2004). Here, we prefer using the FRI as it quantifies financial reform *stricto sensu* and because it is the only index that includes countries from both the EU15 and CEE groups, thus making the analysis of the two subgroups directly comparable.

The variables *IE* in Eq. (3) correspond to a number of indices that assess institutional strength in the countries considered. In particular, we use three indices obtained from the International Country Risk Guide (ICRG) to proxy corruption within the political system (denoted as *corruption*), the quality of the judicial system and popular observance of law (*lawqual*) and the quality of the bureaucracy (*bureauqual*), respectively. Higher values for these indices reflect higher institutional quality. The variables *corruption* and *lawqual* take values between 0 and 6 (inclusive) and the variable *bureauqual* between 0 and 4. Table 1 reports country-specific average for these variables.

The most common form of corruption, which is also relevant for our purposes, is financial corruption in the form of demands for special payments and bribes connected with all sorts of transactions. Such corruption usually makes markets less efficient and generates networking effects that could lead, *inter alia*, to anticompetitive behavior. Our measure accounts for various forms of corruption, such as excessive patronage, nepotism, job reservations, 'favor-for-favors', secret party funding and suspiciously close ties between politics and business. The variable *lawqual*, in turn, is an assessment of the strength and impartiality of the legal system, as well as of the popular observance of the law. Therefore, a country can enjoy a high rating in terms of the quality of the judicial system, but a low rating if enforcement is inferior. These are important for bank competition, because the index reflects the ability of policy authorities to (i) identify various forms of anticompetitive conduct in banking and (ii) impose sanctions. Finally, the institutional strength and quality of the bureau tends to minimize revisions of policy when governments change, enhances states' role in identifying non-competitive conduct and safeguards the regulatory environment in an efficient way. Hence, both *lawqual* and *bureauqual* are expected to have a positive impact on bank competition.

In Eq. (3) we control for a number of bank-specific and macroeconomic variables that may affect the market power of banks. Specifically, we use measures of bank

capitalization and size as proxies for the bank characteristics that may lead to differences in bank market power; and we control for elements of bank ownership and macroeconomic conditions that could also lead to structural changes that affect bank competition. In particular, we use the ratio of equity capital to total assets (*capitalization*) to control for bank capitalization and the natural logarithm of real total assets (*banksize*) to proxy bank size.[11] Well-capitalized and larger banks are probably able to set higher margins or have access to cheaper source of funds due to scale economies, informational asymmetries and moral hazard issues. However, in relatively competitive markets or in banking systems were efficient tacit collusion is in place we do not expect these effects to be present.

To capture the effect of public and foreign ownership we use the asset share of public (*public*) and foreign (*foreign*) owned banks in the industry. Foreign (publicly) owned banks are defined as those with foreign (public) ownership exceeding 50 per cent. To construct these variables we use information from the banks in our sample only. This may be thought of as a source of selectivity bias; however, our sample includes a large portion of the total intermediated assets in the countries considered (approximately 77%) and we feel that these variables are very important elements in our analysis. That is, penetration of foreign owned banks is considered as a significant element of increased competition and better quality of reforms through positive spillovers (see e.g. Javorcik, 2004), while public ownership may lead to either higher market power (mainly owing to networking effects) or to a non-optimizing behavior of banks in relatively underdeveloped banking systems (if governments use commercial banks for purposes other than profit).

Finally, we control for the impact of the macroeconomic environment common to all banks in terms of (i) economic development by including the natural logarithm of GDP per capita (*gdpcapita*), and (ii) stability in the monetary conditions by including the

[11] We have additionally experimented with measures of bank liquidity (measured by the ratio of liquid assets to total deposits) and bank risk-taking (measured either by the ratio of non-performing loans to total loans or the ratio of loan loss provisions to total loans) as bank-level control variables, however we did not find significant changes in the results on our main variables. At the same time the sample is greatly reduced when including the aforementioned variables owing to missing data in the early years of our sample period.

consumer price index (*inflation*) among the regressors. These macroeconomic variables are obtained from the World Development Indicators and the EBRD.[12]

4.2. Estimation results

Two econometric concerns of the regressions of bank market power may be the dynamic nature of bank competition and the potential endogeneity of some of the right-hand side variables. Concerning the former, Berger et al. (2000) among others suggest that even developed banking systems may be characterized by informational opacity, networking and relationship lending. All these elements will cause bank rents and market power to persist to a various degree. To account for this type of persistence in our econometric model, we include the lagged dependent variable among the regressors and we use the method of Blundell and Bond (1998) for dynamic panels to estimate Eq. (3).[13] Besides accounting for the specified dynamics, the latter estimator has two additional virtues. First, it does not break down in the presence of unit roots (for a proof see Binder et al., 2003); and, second, it accommodates the possible endogeneity between market power and some of the independent variables by means of appropriate instruments. In general, a value of the coefficient on the lagged dependent variable statistically equal to 0 implies that bank market power is characterized by high speed of adjustment, while a value statistically equal to 1 means that the adjustment is very slow. Values between 0 and 1 suggest that market power persists, but will eventually return to its normal (average) level. Finally, this coefficient takes implausible (negative) values if convergence to equilibrium cannot be achieved, which probably indicates a problem with the dataset (i.e., very small time dimension of the panel).[14]

The *FRI* and the bank-level variables *capitalization* and *banksize* are considered to be endogenous determinants of market power. On the one hand, higher market power may yield higher profits and therefore higher levels of capital or it may simply be that banks with higher market power have better access to equity capital markets. The same

[12] Ideally, one may also want to control for elements like stock market capitalization, the importance of banking in financing economic activity etc. However, the present analysis is constrained by the availability of data for the early years of our dataset on these country characteristics.
[13] Note that the economic interpretation of the values of L does not imply that this is a censored variable. Econometrically this variable can take any value and therefore a censored-type regression is not required.
[14] For more on these issues, see Nerlove (2002).

type of reverse causality may prevail as regards the relationship between market power and size. On the other hand, banks usually perceive financial reform and foreign bank entry as bound to happen once these begin, which triggers a situation of self-fulfilling expectations. Under this assumption banks may price their products in light of the forthcoming developments in the banking sector or it could be that banks with market power may even exacerbate changes that serve their own interest (especially if institutions are weak in general). As regards the institutional strength variables *per se*, it may hold that banks observe the level of institutional strength and ownership in the beginning of the period and set their interest rate levels accordingly. To this end, the institutional and ownership variables are better modeled as predetermined. Note that in terms of the Blundell and Bond method, endogeneity implies treating the respective variables symmetrically with the dependent variable as regards the instruments used. More specifically, and with the aim of a Sargan test for overidentifying restrictions, the second and third lags of the market power, financial reform and bank-level variables are used as instruments. On the other hand, predeterminancy implies that in addition to the second and third lags, the first lag of the predetermined variables also serves as a valid instrument. Bearing these issues in mind we now turn to the discussion of our empirical results.

Tables 4 and 5 report the estimation results for the EU15 and the CEE countries, respectively, as obtained from a number of different specifications. All specifications include time effects[15] and they seem to fit the panel reasonably well (see associated Wald statistics) with the coefficients across the alternative specifications being fairly stable. In addition, the Sargan test validates the use of the instruments described above (equations are not overidentified). Even though some of the equations indicate that first-order autocorrelation (AR1) is present, this does not indicate that the estimates are inconsistent. Inconsistency would be implied if second-order autocorrelation was present (Blundell and Bond, 1998), but this case is rejected by the test for AR2 errors. The coefficients on the lagged dependent variable average among the different specifications at 0.352 and 0.435 for the EU15 and CEE subgroups, respectively. Given the discussion on the lagged dependent variable above, these values indicate persistence of bank market power to a

[15] Country effects are not included because they are highly correlated with the institutional variables.

moderate extent and, as higher values are observed in the CEE regressions, this is a first indication of the relative opaqueness and rigidity of the CEE banking systems.

The first specification in both Tables 4 and 5 corresponds to a simple regression of *L* on the FRI and bank-level control variables. The results pose an immediate challenge, since opposite and statistically significant signs are found for the coefficient on FRI for the EU15 and CEE cases. In EU15, a negative impact of FRI on market power is identified, which is in line with our expectations. In contrast, in the CEE regressions FRI enters with a positive and significant coefficient, which suggests that financial reforms increase bank market power in these countries. The first consideration would be to control for the institutional and macroeconomic environment and for the ownership variables, so as to examine whether the impact of FRI is modified. This task is carried out in the second specification, however again the findings are different between the two subgroups. In the EU15 countries the impact of FRI remains negative and significant. The institutional variables also enter the equation with a negative and statistically significant coefficient, implying that increased transparency (lower corruption) and bureaucratic and law quality contribute to lower market power of banks. However, in the CEE countries, FRI remains positive (even though it loses on significance), while from the institutional variables only corruption enters with a negative and significant coefficient.

These divergent results between the two groups call for a deeper investigation of the relationship between market power on the one hand and reforms and institutional quality on the other. Given the fact that in those CEEs identified with stronger institutional capacity market power is lower on average (e.g. Czech Republic), and in EU15 countries with lower values on the institutional indices market power is higher (e.g. Greece), we examine the existence of non-linearity in the impact of the financial reform and institutional variables. This analysis is carried out in the third specification of Tables 4 and 5 by adding squared terms on the FRI and institutional variables. In the EU15 case the results remain practically unchanged, which implies that the impact of reform initiatives and institutions is linear. In contrast, significant non-linearity concerning all these variables is identified in the CEE case (a U-shaped relationship is found). This reflects the fact that at the outset of transition in post-communist countries, the rule of

law and the bureaucracy were characterized by low capacity and/or inefficient implementation of the necessary transformations, which spilled over to the level of competition in the banking system. In contrast, the respective EU bureaucracy and the qualitative characteristics of the legal environment has not been a burden in the endeavor of improved competition and efficiency. Notably, the impact of the squared terms is more significant than the impact of their levels and this suggests that financial reforms and better institutions do promote competition after a certain threshold of capacity.

One could actually calculate the threshold values for each variable by using the second derivative of each equation (i.e. calculate the ratio of the coefficient on the level over two times the coefficient on the squared term). For the regression of column 3 these values are 15.35 for *FRI*,[16] 4.35 for *corruption*, 4.25 for *lawqual* and 2.57 for *bureauqual*. Hence, at least for our sample, the CEE countries should reach these values in order to see any benefit in terms of increased competition.

The effect of increased foreign ownership on market power deserves special attention as it appears to be negative and significant across all estimated equations. This result is in line with previous literature that views foreign bank entry as the means to achieve higher efficiency through increased competition and better quality of reforms through positive spillovers (see e.g. Javorcik, 2004). Notably, the negative relationship is stronger in the CEE case, which may reflect the fact that the increased penetration of foreign institutions in the CEE markets are partially responsible for the somewhat decreasing market power of banks towards the last years of reform (see Table 3b). In contrast, if privatization occurs mainly to domestic investors, who may engage in anti-competitive conduct more easily, then market power will probably rise. Effectively, this is also related with the relationship between public ownership and market power, which (in contrast to the EU15 case) is found to be positive and significant at the 5 per cent level for CEE banks. This suggests that publicly owned banks retain excess market power in the CEE countries.

Concerning the rest of the control variables the results are in line with expectations. Higher bank capital and size are positively related with *L*, which is intuitive

[16] Note that most of the EU15 countries obtain values on the FRI considerably lower than 15.35 in 1984 (the starting year of our sample for this group). This suggests that even though we lack data prior to 1984, selectivity bias is not the reason behind the linear relationship between *FRI* and *L* in the EU15 case.

because these banks are usually able to set higher interest rate margins or have access to a wider range of markets and further increase their market power therefrom. The fact that in the more opaque CEE banking systems the impact of bank size is stronger confirms this reasoning. The impact of *gdpcapita* on *L* is different between the two subgroups, being negative in the EU15 banking systems and positive in the CEE ones. Even though marginally significant in both subsamples, this result may again show that richer countries are better able to monitor the market power of banks. Finally, inflation has a negative and significant impact in both subgroups, a result suggesting that monetary anomalies hurt banks' interest rates and lower their profit margins. Note that this result is probably driven by the early years of our sample and the years of the Scandinavian and Russian crises.

In the rest of the specifications we inquire into the robustness of our findings by (i) examining whether the results in the two subgroups are driven by Germany and Russia (i.e. the two countries with a big number of banks), (ii) examining the impact of outliers and (iii) using a panel data instrumental variables (IV) regression instead of a GMM one. In the first two cases (see columns 4 and 5) our results remain practically unchanged (only the impact of public ownership becomes insignificant in the CEE group). For the IV regressions we used the same set of instruments with the GMM regressions and the results are provided in column 6 of both tables. The fit of the regressions is somewhat lower than the GMM equivalent, however no big qualitative differences are found. Overall, the results emphasize the role of the quality of institutions (in terms mainly of capacity and efficiency) and foreign ownership in elevating levels of bank competition. This leads us to our conclusions.

5. Conclusions

If bank competition had been an objective of sectoral liberalization and reform, we see it materialize in the EU15 but far less so in the CEE banking sectors, where the market power of individual banks appears to be increasing during and shortly after the period of reform initiatives. We are reminded once again that the efficient functioning of the banking system is not only a matter of liberalization and privatization; it requires

mature capitalist – including regulatory – institutions, which were relatively lacking in post-communist systems.

In this paper we examined the impact of the quality of institutions on bank market power during the period of financial reforms in EU15 and CEE countries. The period of financial reform in each country has been carefully selected on the basis of the Abiad et al. (2008) index, while market power has been estimated at the individual bank-level across a large number of banks. Our empirical findings confirm the importance of institutional quality, in terms of a positive relationship with bank competition. Thus, institutional endowment is vital for the enhancement of competition following financial liberalization. In particular, the rule of law and bureaucratic quality are negatively related with market power: when they suffer, banks tend to acquire significantly higher market power through higher interest rates at the expense of investors and, by extension, economic growth. Well-performing legal and bureaucratic institutions in the EU15 allowed market competition to emerge as a direct aftermath of sectoral liberalization. The same policies of banking liberalization failed to engender proper competition in the CEE countries before an adequate level of legal, institutional and bureaucratic quality had been reached. Sectoral reform in transition economies does not produce the same efficiency gains as in developed economies until it is backed by well-functioning institutions.

In line with the literature that views foreign bank entry as efficiency-enhancing, foreign penetration also seems to be a crucial factor of increased competition. In other words, market openness and foreign entry contribute significantly to the institutional upgrade of transition economies, enhancing the efficient functioning of their banking sectors. Privatization without foreign entry is not an adequate factor in itself, thus echoing the findings of scholars who have underlined the crony capitalist tendencies witnessed in the early transition stage of privatizing post-communist states.

Overall, our findings corroborate a structural division between EU15 and CEE economies. The competitive effects of banking system reform are linear in the former group of countries but non-linear in the latter: they are exhibited only above a threshold of system "maturity", following considerable exposure to foreign investors and the overcoming of institutional and legal entry barriers.

Appendix. The local regression method

A thorough discussion of local regression is provided in Loader (1999); here we only provide a basic analysis. LR estimation is a consistent way to allow for nonparametric effects within the parametric model, and this is accomplished as follows. The underlying model for local regression is $Y_i = \mu(x_i) + \varepsilon_i$, where x are predictor variables and Y is the response variable. The unknown function $\mu(x)$ is assumed to be smooth and is estimated by fitting a polynomial model (a quadratic in our case, as in most of the literature) within a local sliding window. Therefore, no strong assumptions are made about μ globally, but locally around x we assume that μ can be well approximated. Note that this not a strong assumption when using large and rich datasets like the one of the present analysis. For a fitting point x, define a bandwidth h that controls the smoothness of the fit and a smoothing window (x-$h(x)$, x+$h(x)$). To estimate μ, only observations within this sliding window are used. Therefore, for each fitting point a locally weighted least squares criterion of the following form is considered:

$$\sum_{i=1}^{n} W\left(\frac{x_i - x}{h}\right)\left(Y_i - (a_0 + a_1(x_i - x))\right)^2 \qquad \text{(A.1)}$$

where W is the weight function that assigns largest weights to observations close to x, and takes the form

$$W(u) = \begin{cases} (1-|u|^3)^3 & \text{if } |u| < 1 \\ 0 & \text{otherwise} \end{cases} \qquad \text{(A.2)}$$

The local least squares criterion of Eq. (A.1) is minimized to produce estimates $\hat{a}_0$ and $\hat{a}_1$ for each observation.

This discussion relates to the bivariate local regression. The multivariate local regression simply adds further terms to the right hand-side of the formula for Y and associated with Eq. (A.1). Estimations were carried out using the program Locfit. An important issue in the implementation of LR is the choice of an optimal bandwidth. Many alternatives have been proposed, like plug-in methods and cross-validation (see Kumbhakar et al., 2007). Here we used the generalized cross-validation method (see Loader, 1999), which in our case yields a bandwidth equal to 0.701. For other

applications of local methods to bank data, see e.g. Kumbhakar et al. (2007) and Delis and Tsionas (2009).

References

Amable, B., 2004. The Diversity of Modern Capitalism. Oxford: Oxford University Press.

Angelini, P., Cetorelli N., 2003. The effects of regulatory reform on competition in the banking industry. Journal of Money, Credit, and Banking 35, 663-684.

Baltagi, B., 2008. Econometric Analysis of Panel Data. Chichester: John Wiley & Sons.

Beck, T., Demirguc-Kunt., A., Levine, R., 2000. A new database on financial development and structure. World Bank Economic Review 14, 567-605.

Berger, A.N., Humphrey, D.B., 1997. Efficiency of financial institutions: International survey and directions for future research. European Journal of Operational Research 98, 175-212.

Bresnahan, T., 1982. The oligopoly solution concept is identified. Economics Letters 10, 87-92.

Bresnahan, T., 1989. Empirical studies of industries with market power. In R. Schmalensee & R. Willig (eds), Handbook of Industrial Organization. Holland: Elsevier Science Publications.

Brissimis, S.N., Delis, M.D., Papanikolaou, N.I., 2008. Exploring the nexus between banking sector reform and performance: Evidence from Central and Eastern European countries. Journal of Banking and Finance, forthcoming.

Bröker, G., 1989. Competition in Banking, Paris: OECD.

Demirguc-Kunt A., Laeven L., Levine R., 2004. Regulations, market structure, institutions, and the cost of financial intermediation. Journal of Money, Credit, and Banking 36, 593-622.

Dyson, K. (ed.), 2006. Enlarging the Euro Area: External Empowerment and Domestic Transformation in East Central Europe. Oxford: Oxford University Press.

European Bank for Reconstruction and Development, 2006. Transition Report 2006. London: EBRD.

European Bank for Reconstruction and Development, 2001. Transition Report 2001. London: EBRD.

European Bank for Reconstruction and Development, 1999. Transition Report 1999. London: EBRD.

European Central Bank, 2008. Measuring Financial Integration in EU Member States. ECB Occasional Paper Series, 81, March.

Eyal G., Szelenyi I., and Townsley E., 1998. Making Capitalism without Capitalists. New York: Verso.

Feigenbaum, H., Hennig, J., and Hamnett, C., 1998. Shrinking the State: The Political Underpinnings of Privatization. Cambridge: Cambridge University Press.

Hall, P.A. and Soskice, D. (eds), 2001. Varieties of Capitalism: The Institutional Foundations of Comparative Advantage. Oxford: Oxford University Press.

Hannan, T., 1991. Bank commercial loan markets and the role of market structure: Evidence from surveys of commercial lending. Journal of Banking and Finance 15, 133-149.

Iwata, G., 1974. Measurement of conjectural variations in oligopoly. Econometrica 42, 947-966.

Javorcik, B.S., 2004. Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. American Economic Review 94, 605-627.

Kaminsky, G.L., Schmukler, S.L., 2003. Short-run pain, long-run gain: The effects of financial liberalization. IMF Working Paper No. 03/34.

Keeley, M.C., 1990. Deposit insurance, risk, and market power in banking. American Economic Review 80, 1183-1200.

Kumbhakar, S.C., Lovell, C.A.K., 2000. Stochastic Frontier Analysis. Cambridge: Cambridge University Press.

Kumbhakar, S.C., Lozano-Vivas, A., 2005. Deregulation and productivity: The case of Spanish banks. Journal of Regulatory Economics 27, 331-351.

Lau, L., 1982. On identifying the degree of competitiveness from industry price and output data. Economics Letters 10, 93-99.

Majone, G., 1996. Regulating Europe. London: Routledge.

McMenamin, I., 2004. Varieties of capitalist democracy: What difference does East-Central Europe make? Journal of Public Policy 24, 259-274.

Pagan, A. & Ullah, A., 1999. Nonparametric econometrics. Themes in modern economics. Cambridge: Cambridge University Press.

Pagoulatos, G., 2003. Greece's New Political Economy: State, Finance and Growth from Postwar to EMU, Houndmills: Palgrave Macmillan.

Panzar, J. & Rosse, J., 1987. Testing for "monopoly" equilibrium. Journal of Industrial Economics 35, 443-456.

Papazoglou, C., 2005. The Economies of South Eastern Europe. Performance and Challenges. Houndmills: Palgrave Macmillan.

Rosse, J. & Panzar, J., 1977. Chamberlin vs. Robinson: An empirical test for monopoly rents. Economic Discussion Papers, No. 90. Bell Laboratories.

Salas, V., Saurina, J., 2003. Deregulation, market power and risk behavior in Spanish banks. European Economic Review 47, 1061-1075.

Shaffer, S., 1993. A test of competition in Canadian banking. Journal of Money, Credit, and Banking 25, 49-61.

Shaffer, S., 2004. Comment on "What drives bank competition? Some international evidence" by Stijn Claessens and Luc Laeven. Journal of Money, Credit, and Banking 36, 585-591.

Staniszkis, J., 1991. The Dynamics of Breakthrough. Berkeley: University of California Press.

Uchida, H. & Tsutsui, Y., 2005. Has competition in the Japanese banking sector improved? Journal of Banking and Finance 29, 419-439.

Verdier, D., 2003. Moving Money: Banking and Finance in the Industrializing World. Cambridge: Cambridge University Press.

Yildirim, H.S., Philippatos, G.C., 2007. Restructuring, consolidation and competition in Latin American banking markets. Journal of Banking and Finance 31, 629-639.

Zysman, J., 1983. Governments, Markets and Growth: Financial Systems and the Politics of Industrial Change. Ithaca: Cornell University Press.

Table 1
Sample coverage and averages of country-level variables

Country	Sample	Bank obs.	FRI range	corruption	lawqual	bureauqual	public	foreign	gdpcapita	inflation
Austria	1984-2005	825	8.5-18.5	4.82	6.00	3.90			21179.63	2.41
Belgium	1984-1995	502	12.25-20	5.19	6.00	4.00			18164.56	2.84
Denmark	1984-1995	581	14.25-20.25	6.00	6.00	4.00			24123.97	3.37
Finland	1984-2005	622	10.5-18	6.00	6.00	3.98			20666.29	2.84
France	1984-1996	629	9-20	5.32	5.37	3.98			18657.19	3.23
Germany	1984-1996	6742	15-19	5.29	5.56	4.00			19100.61	3.09
Greece	1984-2005	515	4.75-19	4.28	3.85	2.69			12253.78	10.71
Ireland	1984-1989	141	10.75-20	5.00	4.06	3.50			11352.91	4.54
Italy	1984-2000	607	8-19	3.71	5.28	3.20			16480.73	5.20
Netherlands	1984-1990	298	18-20	6.00	6.00	4.00			17311.54	1.31
Norway	1984-2005	522	9.5-18.25	5.57	6.00	3.79			32327.04	3.43
Portugal	1984-2005	679	3-16.5	4.49	5.11	2.69			9205.08	7.73
Spain	1984-1995	710	10.5-21	4.17	4.67	3.01			10756.43	6.53
Sweden	1984-1989	128	9.75-19	6.00	6.00	4.00			21970.13	6.02
UK	1984-1989	880	17-20	5.75	4.46	4.00			18178.91	5.22
Albania	1991-2005	101	0-19	2.75	2.80	1.23	72.35	27.30	1063.66	30.66
Ajerbaijan	1991-2005	151	6-16	2.93	3.69	1.00	72.14	2.21	747.37	297.04
Belarus	1992-2005	129	7.5-10.5	3.44	3.68	1.00	65.27	6.01	1274.16	379.46
Bulgaria	1991-2005	235	5.75-17.25	3.35	4.43	2.00	46.88	41.61	1611.16	126.60
Czech Rep	1990-2004	192	4.75-19.25	3.96	5.24	3.00	51.10	37.13	5325.56	10.41
Estonia	1991-2001	88	8.5-22	4.74	3.60	2.42	19.56	37.08	3443.18	129.71
Hungary	1990-2004	232	9.5-20.25	4.46	5.02	3.54	33.23	45.20	4349.53	17.17
Kazakhstan	1991-2005	190	4.75-16	2.72	3.67	1.96	14.38	13.79	1338.12	372.65
Latvia	1992-1999	170	8.5-21	3.41	3.54	2.00	13.93	44.09	2564.19	55.75
Lithuania	1992-2005	112	4.75-19.25	3.08	3.72	2.17	35.06	47.39	3346.48	113.37
Poland	1990-2005	435	6.75-17.5	3.90	4.70	3.01	53.91	33.77	3938.76	53.34
Romania	1990-2005	292	2.75-17.5	3.17	4.21	0.98	64.00	25.81	1781.36	81.78
Russia	1993-2005	5645	10.5-18	1.93	3.46	1.35	48.40	6.75	1844.13	126.99
Ukraine	1991-2005	493	8.5-15.5	2.66	3.67	1.44	28.05	8.14	800.86	500.14

Note: The table reports information on the sample and average values for country-level variables. Sample is the time coverage for each country that correspond to period of financial reform; Bank obs. is the number of bank observations of each country; FRI range is the score on the FRI in the beginning and the end of each country's reform period. The rest of the variables correspond to the institutional, structural and macroeconomic determinants of bank market power defined in the text.

Table 2
Descriptive statistics for the bank-level variables

	EU15 countries				CEE countries			
	Mean	St. dev.	Min	Max	Mean	St. dev.	Min	Max
c	117310	355722	18345	450788	55610	191722	8710	322368
q	2357890	3.36e+06	45678	4.90e+08	525017	2186535	22431	7677422
d	1759808	2.66e+06	22784	3.37e+08	427563	1566255	17421	5728463
p	0.076	0.512	0.006	0.321	0.117	1.255	0.013	0.891
w_1	0.037	0.011	0.006	0.085	0.023	0.015	0.002	0.070
wB_2	1.244	0.732	0.205	5.420	1.027	0.707	0.180	5.050
capitalization	2.72	2.29	-6.39	10.84	4.19	3.44	-9.80	11.10
banksize	12.90	2.32	10.02	20.10	12.07	2.07	9.82	17.86

Note: The table presents descriptive statistics of the bank-level variables used in the empirical analysis. The variables are defined as follows. c: real total expenses (proxy of bank cost); q: real total earning assets (proxy of bank output); d: real total deposits and short-term funding; p: total revenue/total earning assets (proxy of the price of bank output|); w_1: personnel expenses/total assets (price of labor); w_2: total depreciation and other capital expenses/total fixed assets (proxy for the price of physical capital; capitalization: equity capital/total assets (proxy for bank capitalization); banksize: natural logarithm of real total assets (proxy for bank size).

Table 3a
Bank competition in EU15 countries

	Austria	Belgium	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Nethe.	Norway	Portugal	Spain	Sweden	UK
1984	0.44	0.38	0.31	0.18	0.34	0.19	-0.09*	0.29	0.37	0.36	0.18	-0.01**	0.31	0.24	0.28
1985	0.37	0.39	0.26	0.15	0.32	0.15	-0.03**	0.27	0.34	0.33	0.16	0.01**	0.28	0.18	0.25
1986	0.33	0.42	0.22	0.16	0.27	0.09	0.04**	0.25	0.34	0.35	0.10	0.06**	0.22	0.12	0.20
1987	0.22	0.29	0.14	0.11	0.25	0.06**	0.04**	0.24	0.31	0.27	0.11	0.05**	0.17	0.13	0.12
1988	0.20	0.26	0.13	0.12	0.26	0.07**	0.08**	0.26	0.29	0.24	0.16	0.09	0.19	0.12	0.10
1989	0.16	0.24	0.14	0.07**	0.23	0.06**	0.16	0.23	0.27	0.19	0.21	0.17	0.17	0.12	0.12
1990	0.18	0.17	0.16	0.09	0.26	0.08**	0.15		0.24	0.18	0.19	0.18	0.14		
1991	0.19	0.15	0.13	0.11	0.27	0.10	0.18		0.23		0.20	0.24	0.15		
1992	0.19	0.16	0.17	0.14	0.28	0.11	0.22		0.20		0.22	0.33	0.18		
1993	0.16	0.19	0.26	0.16	0.30	0.10	0.24		0.18		0.33	0.38	0.20		
1994	0.17	0.15	0.28	0.28	0.28	0.12	0.29		0.23		0.35	0.35	0.19		
1995	0.16	0.16	0.39	0.37	0.27	0.13	0.36		0.25		0.43	0.38	0.20		
1996	0.20			0.42	0.29	0.12	0.45		0.22		0.42	0.40			
1997	0.19			0.40			0.49		0.26		0.40	0.43			
1998	0.19			0.41			0.51		0.29		0.44	0.51			
1999	0.22			0.49			0.55		0.31		0.45	0.48			
2000	0.20			0.43			0.62		0.30		0.43	0.55			
2001	0.21			0.42			0.70				0.48	0.43			
2002	0.23			0.45			0.68				0.43	0.38			
2003	0.24			0.42			0.66				0.46	0.39			
2004	0.23			0.43			0.77				0.49	0.40			
2005	0.28			0.43			0.74				0.47	0.38			

Note: The economic interpretation of the Lerner index (L) is made for values between -1 and 1, with values closer to 1 reflecting higher market power and values closer to 0 increased competition. Negative values reflect non-optimizing behavior of banks. In the case of pure monopoly, L is statistically equal to 1 (denoted by ***); under perfectly competitive behavior, L is statistically equal to 0 (denoted by **); and, finally, $L < 0$ (denoted by *) implies pricing below marginal cost. Approximately 8 points on the index reflect statistically significant changes in the values.

Table 3b
Bank competition in CEE countries

	Albania	Ajer.	Belarus	Bulgaria	Czech Rep	Estonia	Hungary	Kazak	Latvia	Lithu.	Poland	Romania	Russia	Ukraine
1990					0.03**		0.12				0.06**	-0.16*		
1991	0.07**	-0.09*		0.09	0.03**	0.04**	0.17	-0.22*			0.12	-0.14*		-0.03**
1992	0.09	-0.09*	-0.12*	0.12	0.14	0.11	0.21	-0.20*	0.14	0.06**	0.20	-0.12*	0.09	0.06**
1993	0.18	-0.03**	-0.06**	0.13	0.18	0.13	0.20	0.01**	0.22	0.13	0.29	0.12	0.12	0.15
1994	0.27	-0.01**	0.03**	0.21	0.29	0.21	0.26	0.07**	0.31	0.17	0.42	0.10	0.14	0.17
1995	0.41	0.03**	0.05**	0.42	0.27	0.42	0.44	0.14	0.46	0.31	0.49	0.13	0.16	0.20
1996	0.43	0.19	0.08**	0.50	0.28	0.44	0.53	0.18	0.65	0.43	0.51	0.22	0.13	0.19
1997	0.51	0.28	0.12	0.55	0.29	0.60	0.61	0.31	0.72	0.50	0.50	0.45	0.11	0.22
1998	0.59	0.45	0.09	0.51	0.25	0.68	0.55	0.37	0.80	0.55	0.57	0.50	0.14	0.24
1999	0.62	0.48	0.16	0.50	0.26	0.59	0.58	0.44	0.86	0.60	0.68	0.60	0.17	0.25
2000	0.60	0.61	0.18	0.48	0.27	0.55	0.68	0.42	0.79	0.62	0.73	0.54	0.15	0.36
2001	0.66	0.55	0.20	0.55	0.26	0.58	0.71	0.49	0.79	0.60	0.78	0.57	0.20	0.42
2002	0.60	0.51	0.25	0.61	0.22		0.68	0.45	0.76	0.65	0.75	0.50	0.18	0.60
2003	0.54	0.53	0.22	0.67	0.23		0.67	0.48		0.75	0.73	0.48	0.20	0.64
2004	0.48	0.49	0.20	0.66	0.21		0.69	0.56		0.66	0.70	0.56	0.16	0.70
2005	0.52	0.44	0.23	0.59				0.53		0.63	0.66	0.58	0.19	0.65

Note: The economic interpretation of the Lerner index (L) is made for values between -1 and 1, with values closer to 1 reflecting higher market power and values closer to 0 increased competition. Negative values reflect non-optimizing behavior of banks. In the case of pure monopoly, L is statistically equal to 1 (denoted by ***); under perfectly competitive behavior, L is statistically equal to 0 (denoted by **); and, finally, $L < 0$ (denoted by *) implies pricing below marginal cost. Approximately 8 points on the index reflect statistically significant changes in the values.

Table 4
Determinants of bank market power (L) in EU15 countries

	(1) Basic equation	(2) All controls	(3) Squared terms	(4) Excluding Germany	(5) Excluding outliers	(6) IV regression
L_{t-1}	0.341***	0.359***	0.362***	0.345***	0.355***	
	(3.82)	(3.91)	(4.07)	(3.87)	(3.89)	
FRI	-1.018**	-1.046**	-1.057**	-1.046**	-1.059**	-1.037**
	(2.09)	(2.50)	(2.65)	(2.54)	(2.68)	(2.66)
FRI^2			0.008	0.007	0.009	0.009
			(0.54)	(0.46)	(0.63)	(0.61)
corruption		-0.348***	-0.370***	-0.182***	-0.368***	-0.362***
		(5.22)	(5.36)	(3.18)	(5.76)	(5.65)
$corruption^2$			0.017	-0.005	0.006	0.011
			(0.16)	(-0.02)	(0.05)	(0.10)
lawqual		-0.332***	-0.320***	-0.416***	-0.464***	-0.307***
		(3.25)	(3.11)	(3.61)	(3.80)	(3.14)
$lawqual^2$			-0.005	0.001	-0.004	-0.004
			-0.86	0.18	-0.62	-0.64
bureauqual		-0.313***	-0.309***	-0.315***	-0.311***	-0.312***
		(3.05)	(2.90)	(3.15)	(2.97)	(3.01)
$bureauqual^2$			-0.007	-0.006	-0.004	-0.003
			(0.60)	(0.38)	(0.29)	(0.22)
capitalization	0.125***	0.114***	0.116***	0.119***	0.114**	0.131***
	(9.22)	(8.68)	(8.72)	(8.79)	(8.70)	(8.82)
banksize	0.111**	0.101**	0.103**	0.114**	0.104**	0.097**
	(2.41)	(2.20)	(2.25)	(2.53)	(2.25)	(2.08)
public		0.030	0.028	0.036	0.029	0.033
		(0.84)	(0.80)	(1.07)	(0.82)	(1.00)
foreign		-0.016**	-0.015**	-0.012**	-0.015**	-0.019**
		(2.14)	(2.13)	(2.00)	(2.12)	(2.06)
gdpcapita		-0.025*	-0.027*	-0.029*	-0.026*	-0.020*
		(1.75)	(1.78)	(1.83)	(1.77)	(1.79)
inflation		-0.021**	-0.024**	-0.033**	-0.023**	-0.012**
		(2.07)	(2.15)	(2.31)	(2.13)	(1.94)
Bank obs.	14381	14381	14381	7639	12942	14381
Country obs.	214	214	214	201	214	214
Wald (p-value)	0.001	0.000	0.000	0.000	0.000	0.000
Sargan (p-value)	0.137	0.168	0.143	0.223	0.150	
AR1 (p-value)	0.083	0.084	0.095	0.112	0.090	
AR2 (p-value)	0.017	0.022	0.019	0.037	0.016	

Note: The table presents coefficients and t-statistics (in parentheses) of determinants of market power *L* in the EU15 countries. All equations include time effects. Squared variables are included to capture potential non-linearity were appropriate. Bank obs. is the number of bank observations in the sample; Country obs. is the number of country observations in the sample; Wald is a Wald-statistic for the joint significance of the coefficients (found to be significant at the 1% level for all equations). Sargan is the Sargan test for overidentifying restrictions. AR1 and AR2 are tests for first and second order autocorrelation, respectively. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively.

Table 5
Determinants of bank market power (L) in CEE countries

	(1) Basic equation	(2) All controls	(3) Squared terms	(4) Excluding Russia	(5) Excluding outliers	(6) IV regression
L_{t-1}	0.447***	0.436***	0.432***	0.432***	0.429***	
	(6.25)	(6.01)	(5.88)	(5.90)	(5.79)	
FRI	1.900***	0.942*	0.921**	0.991**	0.924**	0.902**
	(3.60)	(1.80)	(2.17)	(2.62)	(2.22)	(1.94)
FRI^2			-0.030***	-0.032***	-0.031***	-0.027***
			(3.13)	(3.47)	(3.20)	(3.03)
corruption		-0.391***	0.479***	0.465***	0.487***	0.405**
		(4.53)	(3.06)	(2.92)	(3.23)	(2.61)
$corruption^2$			-0.055***	-0.055***	-0.057***	-0.048***
			(5.67)	(5.80)	(5.74)	(5.12)
lawqual		-0.135	0.264*	0.267**	0.266**	0.231*
		(0.99)	(1.87)	(1.90)	(1.89)	(1.78)
$lawqual^2$			-0.031***	0.032***	0.033	0.027***
			(5.29)	(5.42)	(5.45)	(3.52)
bureauqual		-0.095	0.180**	0.167*	0.176**	0.152*
		(1.26)	(1.95)	(1.81)	(1.91)	(1.83)
$bureauqual^2$			-0.035***	-0.031***	-0.034***	-0.026***
			(3.79)	(3.60)	(3.76)	(2.91)
capitalization	0.139***	0.129***	0.121***	0.146***	0.124***	0.118
	(7.10)	(6.71)	(6.07)	(7.80)	(6.16)	(5.70)
banksize	0.200***	0.186***	0.194***	0.203***	0.196***	0.180**
	(3.12)	(2.92)	(3.03)	(3.30)	(3.08)	(2.67)
public		0.172*	0.175**	0.049	0.179**	0.161*
		(1.85)	(1.91)	0.88	(1.96)	(1.85)
foreign		-0.129***	-0.131***	-0.137***	-0.134***	-0.120
		(7.21)	(7.40)	(7.69)	(7.51)	(5.48)
gdpcapita		0.019	0.020	0.029**	0.023*	0.018
		(1.64)	(1.66)	(1.91)	(1.76)	(1.62)
inflation		-0.034***	-0.036***	-0.025**	-0.036***	-0.029**
		(3.28)	(3.33)	(2.21)	(3.37)	(2.59)
Bank obs.	8465	8465	8465	2820	7618	8465
Country obs.	201	201	201	201	201	201
Wald (p-value)	0.002	0.000	0.000	0.000	0.000	0.000
Sargan (p-value)	0.201	0.248	0.226	0.188	0.217	
AR(1) (p-value)	0.043	0.066	0.070	0.088	0.068	
AR(2) (p-value)	0.010	0.016	0.016	0.030	0.015	

Note: The table presents coefficients and t-statistics (in parentheses) of determinants of market power *L* in the EU15 countries. All equations include time effects. Squared variables are included to capture potential non-linearity were appropriate. Bank obs. is the number of bank observations in the sample; Country obs. is the number of country observations in the sample; Wald is a Wald-statistic for the joint significance of the coefficients (found to be significant at the 1% level for all equations). Sargan is the Sargan test for overidentifying restrictions. AR1 and AR2 are tests for first and second order autocorrelation, respectively. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively.